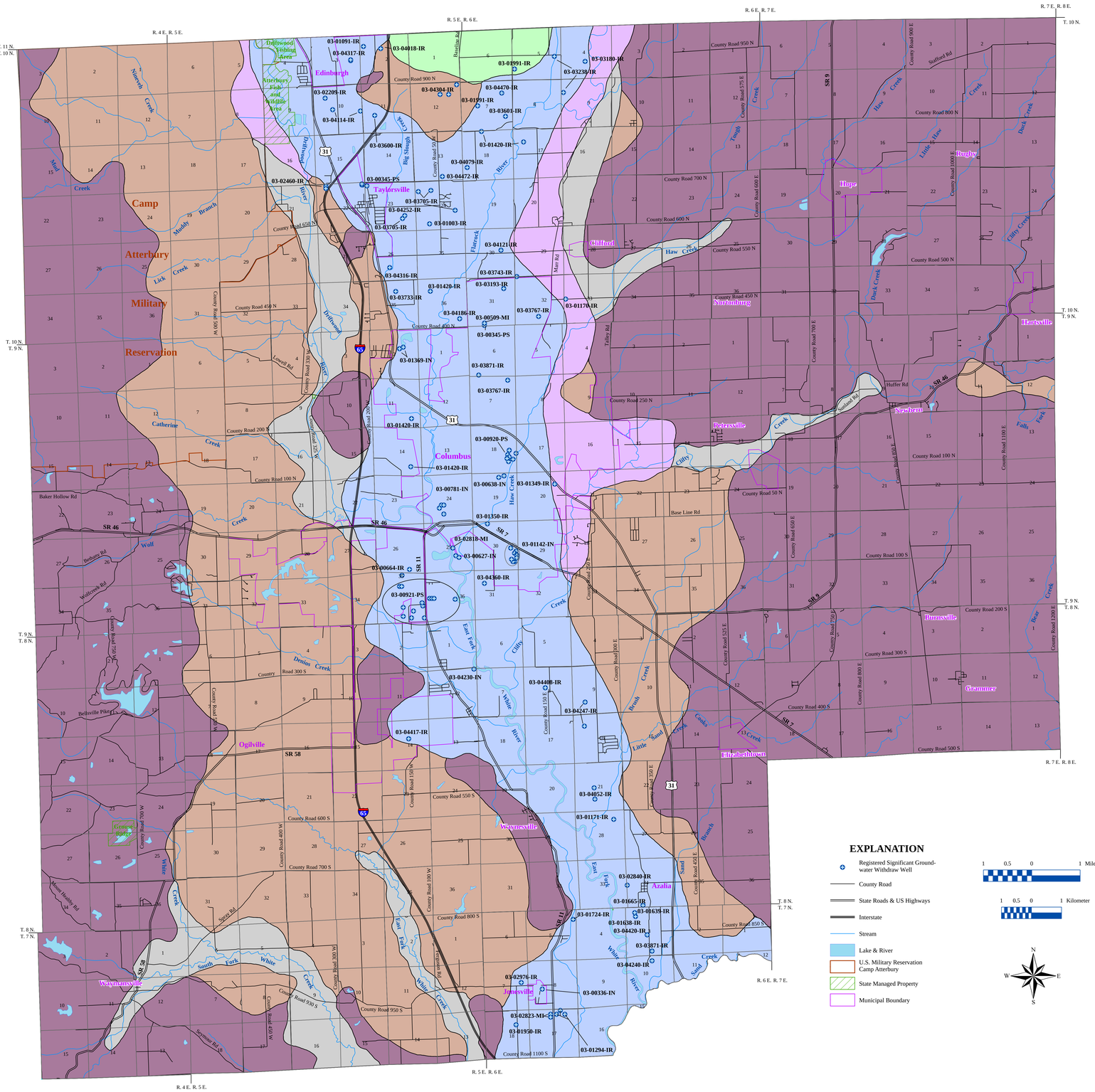
UNCONSOLIDATED AQUIFER SYSTEMS OF BARTHOLOMEW COUNTY, INDIANA



Six unconsolidated aquifer systems have been mapped in Bartholomew County: the Dissected Till and Residuum; the Alluvial, Lacustrine, and Backwater Deposits; the Pre-Wisconsin Drift; the Buried Valley; the White River and Tributaries Outwash; and the White River and Tributaries Outwash Subsystem. Boundaries of these aquifer systems are commonly gradational, and individual aquifers may extend across aquifer system boundaries.

Bartholomew County has been completely covered by pre-Wisconsin glacial sediments followed by Wisconsin glacial sediments that covered the eastern two thirds of the county. As the Wisconsin glaciers advanced and retreated, vast amounts of outwash, alluvial, and lacustrine sediments were deposited in the central portion of Bartholomew County.

The thickness of unconsolidated sediments in Bartholomew County is quite variable. Sediments that overlie bedrock range from 5 feet in areas where only residuum or thin drift is present to as much as 155 feet where till, outwash, alluvial, and lacustrine deposits are present. Also, bedrock is exposed near the east county line along portions of the Falls Fork of Clifty Creek.

Regional estimates of aquifer susceptibility to contamination from the surface can differ considerably from local reality. Variations within geologic environments can cause variation in susceptibility to surface contamination. In addition, man-made structures such as poorly constructed water wells, unplugged or improperly abandoned wells, and open excavations, can provide contaminant pathways that bypass the naturally protective clays.

Dissected Till and Residuum Aquifer System

The Dissected Till and Residuum Aquifer System is mapped along the western edge of Bartholomew County and over most of the eastern third of the county. It has the most limited ground-water resources of the unconsolidated aquifer systems.

Unconsolidated deposits of this aquifer system consist mostly of till with thin layers of stratified drift and, in some areas along the westernmost edge of the county, thin, eroded bedrock residuum. Thickness of these sediments typically ranges from less than 5 feet (where only residuum is present) to 80 feet (where thick glacial till deposits have filled small bedrock valleys).

Because this aquifer system is generally thin and not very productive, most drillers prefer to complete wells in the underlying bedrock aquifer. However, a few wells have been completed in the unconsolidated deposits. Large-diameter bored wells are more likely to be successful than conventionally drilled wells.

Total well depths are commonly 35 to 50 feet. Where present, thin sands and gravels are commonly from 1 to 5 feet thick and typical wells yields are less than 10 gallons per minute (gpm).

Because of the low permeability of the surface materials, this aquifer system is not very susceptible to contamination from surface sources.

Alluvial, Lacustrine, and Backwater Deposits Aquifer System

The Alluvial, Lacustrine, and Backwater Deposits Aquifer System is made up of heterogeneous bodies of alluvial, colluvial, and lacustrine materials within valley bottoms and terraces of some larger streams tributary to the East Fork White River.

Unconsolidated deposits within this system come from two sources. The first is alluvium deposited by streams along with colluvium eroded from valley walls and upland areas. The second source is glaciolacustrine deposits formed in relatively stagnant lake water. The alluvial deposits are attributed to the White River valley becoming choked with outwash from receding glaciers. The outwash deposits effectively dammed the tributary streams, thus creating lakes in which fine-grained glaciolacustrine deposits accumulated.

In Bartholomew County this system is mapped along portions of several tributaries to the East Fork White River. These include: Clifty Creek in the east central portion of the county; the Driftwood River in the north-central portion of the county; the south and east forks of White Creek in the southwest portion of the county; and the Flatrock River and Haw Creek to the northeast of Columbus.

Total thickness of unconsolidated materials overlying bedrock in this system is commonly less than 50 feet. In other counties where this system is mapped sand and gravel lenses, where present, are typically less than 5 feet thick. However, in isolated areas of Bartholomew County sand and gravel deposits can be up to 15 feet thick.

This aquifer system is a limited resource and there are no known wells that actually produce from these deposits. Drillers commonly bypass the unconsolidated deposits in favor of the underlying bedrock aquifers. In many places large-diameter bored (bucket-rig) wells could produce adequate water from sands within the predominantly clay and silt materials of this aquifer system to satisfy domestic needs.

This aquifer system is generally marked by thick surface deposits of soft silt and clay that have a low susceptibility to surface contamination. The susceptibility is greater in areas where the surficial silt and clay deposits are thin and directly overlie outwash deposits.

Pre-Wisconsin Drift Aquifer System

The Pre-Wisconsin Drift Aquifer System in Bartholomew County is mapped predominantly along a north-south band in the west-central part of the county. It is also present in several smaller areas in the eastern half of the county.

In Bartholomew County thick glacial deposits having multiple sand and gravel units characterize this system. Well depths are typically from 40 to 80 feet. Aquifer materials include multiple, discontinuous intratill sand and gravel units. The aquifer units are commonly 5 to 15 feet thick. Surficial clay deposits overlying aquifer materials are commonly from 25 to 65 feet.

In some areas the Pre-Wisconsin Drift Aquifer System includes an upper sand or gravel unit that in most cases drillers will bypass in favor of a lower unit. Thickness of the upper unit ranges from 1 to 6 feet and is separated from the lower unit by clay that ranges in thickness from 8 to 55 feet.

Domestic well yields range from 1 to 40 gpm but are typically 5 to 20 gpm. In some isolated areas where outwash deposits are thicker this system can meet the needs of some high-capacity users. There are three registered facilities (6 wells) that report well capacities that range from 55 gpm to 300 gpm. Static water levels range from 2 to 100 feet below land surface but are typically 15 to 45 feet.

The Pre-Wisconsin Drift Aquifer System is generally not very susceptible to surface contamination because its intratill sand and gravel units are overlain by thick till deposits.

Buried Valley Aquifer System

The Buried Valley Aquifer System consists of aquifer materials deposited in pre-glacial bedrock valleys. During valley development, layers of bedrock were eroded to create valleys that were subsequently filled with unconsolidated glacial sediment of variable thickness. Although there are additional buried bedrock valleys in Bartholomew County, only the larger buried valleys that contain significant water-bearing sediments have been included as mapped units of the Buried Valley Aquifer System.

The Buried Valley Aquifer System is mapped along a small area of the north-central portion of Bartholomew County. The valley cuts as deep as 115 feet into Silurian and Devonian bedrock.

Thickness of unconsolidated deposits of the Buried Valley Aquifer System differs somewhat in Bartholomew County from that of Shelby County to the north. In general, as the system extends north across the county boundary the clay and outwash deposits thicken as topography increases.

There are very few water well records available in the Buried Valley Aquifer System in Bartholomew County. Well depths are typically from 50 to 75 feet. Aquifer materials include outwash sand and gravel deposits that are typically 15 to 30 feet thick. Clay deposits that overlie the aquifer materials range from 3 to 25 feet thick.

This aquifer system has the potential to meet the needs of domestic and some high-capacity users. Domestic well yields are typically 10 to 15 gpm. There is one registered high-capacity facility (one well) with a reported yield of 1000 gpm. Also, there is one registered high-capacity facility near the county line in Shelby County that is reported to have the capability of pumping up to 1200 gpm. Typical static water levels range from 10 to 35 feet below surface in the lowland areas. In upland areas static water levels are most likely deeper.

The Buried Valley Aquifer System is generally not very susceptible to surface contamination. Thick till deposits overlie the aquifer units and inhibit the downward migration of contaminants. The susceptibility is greater in areas where the clay deposits are thin and directly overlie outwash deposits.

White River and Tributaries Outwash Aquifer System

The White River and Tributaries Outwash Aquifer System is mapped approximately as a wide north-south band across the central portion of Bartholomew County. This system contains large volumes of outwash and alluvial deposits that filled the river valley of the East Fork White River. As the glaciers melted, the quantity of sediment was too large for the streams to transport. As a result, the increased sediment load was stored in the valley as vertical and lateral accretionary deposits. As long as the retreating glaciers continued to provide sediment in quantities too large for the streams to transport, the main valley continued to be filled. These deposits formed the most prolific aquifer system in the county.

The thickness of unconsolidated deposits overlying bedrock can be as much as 130 feet within this system. Well depths are typically 40 to 70 feet. Aquifer materials include predominantly sand and gravel deposits that range from 5 to 125 feet thick but are more commonly from 35 to 65 feet thick. In some areas 5 to 10 feet of clay or silt overlie the aquifer materials.

This system has the greatest potential of any aquifer system in Bartholomew County and can meet the needs of domestic and high-capacity users. Domestic well yields range from 5 to 35 gpm. There are 57 registered high-capacity facilities (112 wells) in this system. Reported well capacities are up to 2400 gpm but are typically 300 to 1000 gpm.

In areas that lack overlying clays, this aquifer system is highly susceptible to contamination from surface sources. Where the aquifer system is overlain by clay or silt deposits, the aquifer is moderately susceptible to surface contamination.

White River and Tributaries Outwash Aquifer Subsystem

The White River and Tributaries Outwash Aquifer Subsystem includes areas adjacent and parallel to the White River and Tributaries Outwash Aquifer System. The outwash subsystem typically occupies a higher topographic position than that of the outwash system and is marked by thinner outwash deposits that may be overlain by sandy clay, clay, or eolian-derived loess and sand.

The White River and Tributaries Outwash Aquifer Subsystem is mapped along a small area in the northwest part of the county along the west edge of the Driftwood River and along Clifty Creek to the east of Columbus continuing north-northeast into Shelby County.

There are few wells in the White River and Tributaries Outwash Aquifer Subsystem. Total thickness of unconsolidated deposits overlying bedrock ranges from 65 to 150 feet. The thickness of aquifer materials within the unconsolidated deposits are typically between 5 and 45 feet. Well depths range from 30 to 105 feet below surface but are typically between 30 to 60 feet below surface. Many wells do not penetrate the full thickness of the aquifer system.

This aquifer system has the potential to meet the needs of domestic and some high-capacity users. There are two registered significant water withdrawal facilities (2 wells) that report capacities of 180 gpm and 1000 gpm. Domestic well yields are typically from 10 to 30 gpm. Static water levels are typically between 10 and 20 feet below surface.

Areas within this aquifer system that have overlying clay or silt deposits are moderately susceptible to surface contamination; whereas, areas that lack overlying clay or silt deposits are highly susceptible to contamination.

Map generated by Jennifer K. Mc Millan and Joseph L. Phillips
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This map was created from several existing shapefiles. Township and Range Lines of Indiana (line shapefile, 20020621), Land Survey Lines of Indiana (polygon shapefile, 20020621) and County Boundaries of Indiana (polygon shapefile, 20020621), were from the Indiana Geological Survey and based on a 1:24,000 scale. Draft road shapefiles, System1 and System2 (line shapefiles, 2003), were from the Indiana Department of Transportation and based on a 1:24,000 scale. Populated Areas in Indiana 2000 (polygon shapefile, 20021000) was from the U.S. Census Bureau and based on a 1:100,000 scale. Streams27 (line shapefile, 20000420) was from the Center for Advanced Applications in GIS at Purdue University. Managed Areas 96 (polygon shapefile, various dates) was from IDNR. Unconsolidated Aquifer Systems coverage (Maier, 2004) was based on a 1:24,000 scale.

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